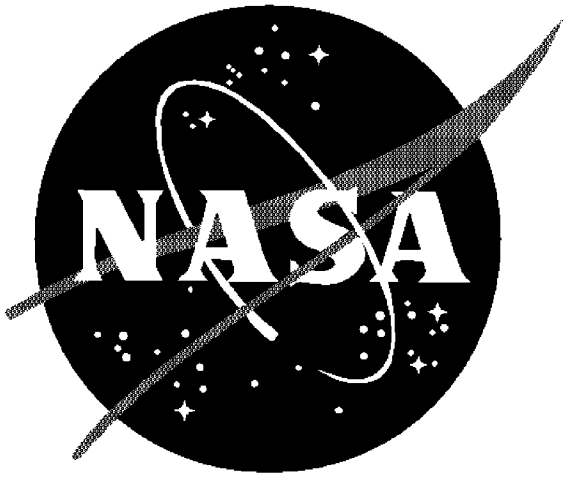

National Aeronautics and Space Administration

October 3, 2001

NRA-01-OES-03

RESEARCH ANNOUNCEMENT

OCEAN, ICE, AND CLIMATE

Notice of Intent Due November 5, 2001
Proposals Due December 4, 2001

OMB Approval No. 2700-0087

OCEAN, ICE AND CLIMATE

NASA Research Announcement
Soliciting Research Proposals
by
December 4, 2001

NRA-01-OES-03
Issued October 3, 2001

Office of Earth Science
National Aeronautics and Space Administration
Washington, DC 20546

NASA RESEARCH ANNOUNCEMENT

OCEAN, ICE AND CLIMATE

1.0 PURPOSE OF THIS NASA RESEARCH ANNOUNCEMENT

The purpose of this NASA Research Announcement (NRA) is to solicit ocean, ice, and climate research contributing to a unified approach to studying the more slowly varying components of the earth's climate system. The NRA specifically seeks proposals for scientific investigations and activities contributing to the continuation and enhancement of NASA's Physical and Biological Oceanography and Cryospheric Sciences Programs. It also seeks proposals that utilize this knowledge in facilitating the development and evaluation of models and data assimilation systems that include representations of the oceanic and cryospheric aspects of the Earth System. In particular, this announcement solicits investigations that contribute to NASA's Seasonal-to-Interannual Prediction Project (NSIPP). The present announcement is for the selection of investigations to be carried out for a period of up to 3 years.

2.0 BACKGROUND

2.1 NASA's Earth Science Enterprise

NASA's Earth Science Enterprise (ESE) seeks to develop an understanding of the total Earth system and the effects of natural and human-induced changes on the global environment. The ESE's Science Research Strategy is available from the NASA Earth Science Enterprise Web site (http://www.earth.nasa.gov/visions/researchstrat/Research_Strategy.htm). The key research topics supported by the ESE, and outlined in the plan, fall largely into the categories: variability, forcings, responses, consequences and predictions. This conceptual approach applies to all research areas of NASA's Earth science program, although it is particularly relevant to the problem of climate change, a major Earth science-related issue facing the world. The Strategic Plan also lists research questions under each theme of Earth science, and the ones that apply to this NRA are listed in the next Section.

The overall approach for the ESE is to acquire a multi-decadal, multi-sensor, global, data set for critical environmental parameters (systematic measurements), accompanied by one-time global observations needed to better characterize and understand specific Earth system components and/or processes, in situ measurements (especially those associated with process-oriented field campaigns and satellite validation), and models for the purposes of characterizing, understanding, predicting important Earth system processes. Systematic observations are being and will continue to be provided by NASA and by other international space agencies within the near term (1-5 years), and plans are being developed to transition these observations to operational agencies in 5-10 years. NASA will continue to develop space-based exploratory and technology-demonstration missions in response to scientific needs and priorities.

2.2 Program Descriptions

The Oceanography and Cryospheric Sciences Programs and the NASA's Seasonal-to-Interannual Prediction Project (NSIPP) are focusing on specific science questions from the ESE Research Strategy. Many of these questions have links to individual disciplines as well as the unification of process knowledge gains in their respective fields. The questions (listed on page 3 of the Research Strategy) concern the natural and human-induced variability in the ocean, the responses of the ocean to that variability, and their interactions with other parts of the climate system. Other questions pertain specifically to the Earth's ice cover and its relationship to the Earth system. These questions are:

1) How is the global ocean circulation varying on interannual, decadal, and longer time scales?
2) How are global ecosystems changing?
3) What changes are occurring in the mass of the Earth's ice cover?
4) How can climate variations induce changes in the global ocean circulation?
5) How is global sea level affected by climate change?
6) How do ecosystems respond to and affect global environmental change and the carbon cycle?
7) What are the consequences of climate and sea level changes and increased human activities on coastal regions?
8) How well can transient climate variations be understood and predicted?
9) How can long-term climatic trends be assessed or predicted?

This NRA will address oceanographic investigations, sea ice and ice sheet research, and seasonal-to-interannual climate prediction efforts that relate to one or more of the above nine questions. To this end, the ESE Research Strategy calls for: a) global observations of the ocean, in terms of color, altimetry, surface winds, surface temperature, and sea-ice; b) ice sheet, ice cap, and glacier observations in order to determine their mass balance and contributions to sea level rise; and c) the development of models that enable these observations to be interpreted. The programs place emphasis on the productive cross-fertilization of activities related to observations, modeling, and field campaigns. The NASA Oceanography Program also participates in the National Oceanographic Partnership Program (NOPP) which solicits proposals approximately once per year through a Broad Agency Announcement. NASA has focused much of its support for activities related to the Global Ocean Data Assimilation Experiment (GODAE) through the NOPP and expects to continue this approach. Seasonal-to-interannual climate prediction at NASA is focused primarily through the NSIPP. The NSIPP core effort at Goddard Space Flight Center is supported by a science team built through this announcement.

The primary scientific thrust for **physical oceanography** at NASA is toward understanding the ocean's role in climate variability and its prediction. Since the general ocean circulation plays a critical role in the global heat balance and materially changes atmospheric properties through air-sea exchange, basic understanding and modeling the state of the coupled ocean-atmosphere system is fundamental to climate studies. NASA utilizes the unique vantage point of space to enable rapid collection of global ocean data sets such as sea-surface temperature (EOS Terra, the Tropical Rainfall Measuring Mission, TRMM), sea-surface topography (TOPEX/Poseidon), sea-surface vector winds

(QuikSCAT). Through such activities as these, NASA will contribute to the World Climate Research Program's Climate Variability and Predictability (CLIVAR) Program.

The emphasis for research in **biological oceanography** will be the role of the ocean in the carbon cycle. One of the unknowns is the magnitude and variability of the so-called 'biological pump', that is, how much carbon is exported from the surface to the deep ocean. NASA's contribution to this effort is to understand the variability in primary producers, the phytoplankton, through satellite observations of ocean color. Much of the spatial and temporal variability of phytoplankton in the ocean is caused by blooms, and the blooms are usually characterized by particular species of phytoplankton. Thus, by both determining the nature of the variability in ocean color, and by being able to determine the species responsible, significant progress will be made in understanding the ocean's role in the global carbon cycle. The Sea Wide-Field-of-View Sensor (SeaWiFS), together with the Moderate Resolution Imaging Spectroradiometer (MODIS) (on EOS Terra and Aqua satellites), will be able to view the phytoplankton content of the ocean on unprecedented time and space scales. MODIS, in particular, has the potential to aid in the identification of taxonomic groups of phytoplankton from space. MODIS will also, be able to discriminate phytoplankton from other optical components in coastal waters by observing fluorescence emission, and the variability in production and export that occur in the coastal waters is an important thrust for biological oceanography.

No complete understanding biological variability in the ocean will be forthcoming without complementary knowledge of the physical processes acting upon it. Thus, images of ocean color, which portray biological variability are driven by physical processes, such as surface winds and circulation. A variety of sensor types, therefore, can be applied to solving problems in biological oceanography. At the same time, it is recognized that there are regions of the ocean (e.g., the tropics, near coastlines) where one or more satellite sensors will have difficulty in making accurate observations. The conclusion is that multiple sensors can be employed advantageously to aid in understanding oceanographic processes. Or, there may be novel ways to extend the use of altimetric, temperature, or wind sensors to provide insight into productivity or biological phenomena.

An emerging area of increased emphasis in NASA's Oceanography Program is research on the coastal ocean. While NASA's focus will remain global in nature, it is recognized that the practical problems of humanity's interaction with the ocean lie within the coastal seas.

Model simulations of **sea ice** and global climate indicate that the polar regions of the Earth, particularly the Arctic, are most sensitive to climate change. Among the reasons for this sensitivity are the positive albedo feedback that result from the warming and melting of snow and ice, and the changes in thermohaline circulation and energy exchanges associated with the formation and melting of sea ice. Simulations of future climate are therefore very sensitive to the ways in which the high latitudes are represented in models of the climate system. By supporting the development and analysis of extensive and novel observations of the polar regions acquired by current space-based systems such as DMSP, Radarsat, QuikSCAT and future missions such as EOS Aqua and ICESat, expected to be operating within a year, NASA can make significant contributions to the understanding of sea ice processes. Consequently, NASA has an important role to play in helping to refine the way in which high latitude climate and the polar oceans and sea ice in particular are simulated.

These same observations and analysis methods can also be used to establish the nature and significance of current change in the high latitudes. It is important to understand the relationships between sea-ice characteristics, and ocean and atmospheric dynamic and thermodynamic processes. This will aid in determining the role of sea ice in the global climate system and understanding how changes in sea ice characteristics will influence and respond to climate changes. In recent years much attention has been focused on describing teleconnections between elements of the climate system at high latitudes, which has been made possible through the advent of wide-coverage observations of a variety of geophysical parameters that now extend back, in many cases, for 2 or more decades.

Determining the mass balance of the Earth's **ice sheets** and other large ice masses continues to be a high priority of the Cryospheric Sciences Program. Since 1995, NASA's Program for Arctic Regional Climate Assessment (PARCA) has focused a coordinated effort on determining the mass balance of the Greenland ice sheet through a combination of targeted field campaigns, satellite data analysis, aircraft observations, and process modeling. PARCA has provided the first overall observational assessment of the ice sheet mass balance, showing significant changes near coastal region. The second phase of PARCA will be aimed at understanding the mechanisms that drive these observed changes while continuing to monitor them. A variety of PARCA data sets have been developed and are being made available through links at the National Snow and Ice Data Center (NSIDC) at URL: http://nsidc.org/NASA/PARCA/. A report from the last PARCA meeting identifying considerations for future directions for Greenland mass balance research is also available at the same URL. Individuals interested in submitting proposals investigating the Greenland ice sheet are encouraged to visit this web site and review the report from the 2000 PARCA Science and Planning Meeting.

NASA has historically not supported ice sheet field activities in Antarctica because of budget limitations, and such activities have been the purview of the National Science Foundation. However, there have been extensive satellite observations of all or parts of the continent, which are valuable for mass balance and process studies. Among the more notable ones recently have been Landsat-7 observations, and the first and second Radarsat Antarctic Mapping Missions. These observations, as well as those in Greenland, will be further enhanced following the launch of ICESat in 2002, which has as its primary function the assessment of ice sheet elevation changes for measurement of mass balance.

Additional satellite remote sensing investigations of both Greenland and Antarctica have made use of scatterometry, passive microwave radiometry, synthetic aperture radar (SAR) backscatter and interferometry, and various visible and thermal sensors. In the case of Greenland, airborne measurements have included laser altimetry for surface elevation changes, and ice penetrating radar for measurement of ice thickness and detection of internal structure. These remote sensing measurements, along with in situ observations, and modeling activities have significantly increased our capabilities of studying glaciers and ice sheets. However, large uncertainties remain in the mass balance characteristics, and the processes that control these balances must be better quantified and understood.

A recent NRC review of NASA's **polar data sets** (Walsh et al., 2001, *Enhancing NASA,s Contribution to Polar Science*, National Academy Press) recommended a number of areas in which additional attention should be paid. Among those of particular relevance to

sea ice and ice sheets are: polar precipitation, surface albedo, surface temperature, surface turbulent fluxes, ocean surface salinity, ice sheet mass flux, and sea ice thickness. This report is available through the National Academy Press at http://www.nap.edu. While proposals that address gaps in our knowledge in these areas are encouraged, the link to the NRA objectives must be clear and strong. In addition, there are several Pathfinder polar data sets that are appropriate for research under this NRA. Links to these can be found at http://nsidc.org/NASA/polar_pathfinders/ and the more recent scatterometry pathfinder data set can be accessed through: http://www.scp.byu.edu/.

Understanding and predicting seasonal-to-interannual climate variations is recognized as an essential goal of NASA's Earth Science Enterprise within the overall NASA strategy for climate research. This has been partially realized through **NASA's Seasonal-to-Interannual Prediction Project**. By focusing on the application of remotely sensed observations, NASA expects to make unique contributions to the climate theme of the USGCRP and to the CLIVAR and GEWEX international research programs.
NSIPP seeks to demonstrate the use of satellite data, especially altimeter, scatterometer and microwave data, in model prediction systems, to assess the role of satellite data as part of a global observing system, and to aid in the design of the observing system by conducting Observing System Simulation Experiments (OSSE's) and predictability studies. The NSIPP approach is based on the expectation that coupled models offer the best prospect for extending prediction of tropical sea surface temperature (SST) anomalies to prediction of global precipitation and temperature anomalies. The components of such a model system consist of oceanic and atmospheric general circulation models (OGCM and AGCM) and an interactively coupled interface between them, a land surface hydrological model coupled to the AGCM, and (for some applications) a sea-ice model coupled to both OGCM and AGCM. Since suitable component models already exist, the primary NSIPP focus will be on developing effective coupling of these models and on evaluation of experimental seasonal-to-interannual (S-I) climate predictions using such coupled models.

A necessary prerequisite for initializing predictive model systems is a set of gridded fields of the prediction variables at the initial time. These are most effectively provided using model-based data assimilation methods. NSIPP will have a secondary focus on development and application of ocean data assimilation techniques suitable for the S-I prediction problem. NSIPP plans to utilize Monte Carlo assimilation techniques as well as the global data assimilation system of the GSFC Data Assimilation Office (DAO) for atmospheric and land surface data assimilation, perhaps with modifications appropriate for the S-I prediction problem. More information on the NSIPP and its progress may be found at http://nsipp.gsfc.nasa.gov

3.0 RESEARCH TOPICS FOR REQUESTED PROPOSALS

This NASA Research Announcement solicits proposals that address the following topics. Proposals may include elements associated with more than one topic, but must clearly delineate the work and budget for each topic. Each topic is described in greater detail in the following section.

1) Analysis and interpretation of ocean processes using satellite, aircraft, and in situ data.

With NSF, the program shares funding proposals submitted for synthesis of results from the World Ocean Circulation Experiment (WOCE). In addition to WOCE synthesis, the present announcement seeks proposals undertaking analysis of satellite altimetry, surface wind stress, and other relevant data in support of the CLIVAR Program. Theoretical developments in the area of longer time-scale coupled atmosphere-ocean modes of variability are also sought to catalyze future data analyses. Under this topic as well, are analyses and models which couple physical an biological processes in the ocean, at regional to global scales, and which can incorporate the behavior of different plankton trophic levels and taxonomic groups.

2) Multi-sensor approach to understanding ocean phenomena.

   One obvious example is that color, altimetry (sea surface height) and temperature indicate upwelling areas. An emerging area of research in remote sensing that NASA will exploit is the use of ocean color variability to indicate physical phenomena (circulation, upwelling), and, vice-versa, the use of dynamic topography and winds (for example) to estimate productivity.

3) Understanding and estimation of air-sea fluxes

   The ability to make global estimates of air-sea fluxes of heat, freshwater, momentum, and gases is fundamental to our capability to predict long-term climate variations. Development of methodologies to utilize remotely-sensed properties of the sea surface to determine fluxes are sought. Research is also solicited to establish the role of sea-ice in modulating key fluxes between the ocean and the atmosphere and in particular in controlling thermohaline circulation. In addition, research that examines direct atmosphere/sea ice, energy, and momentum exchanges is also encouraged.

4) Providing the scientific basis for next generation ocean and ice remote sensing technologies.

   Priority areas presently supported include GPS reflection phenomenology, surface salinity remote sensing and sea-ice thickness measurement (including snow cover), optical sounding of the ocean with lasers, and hyperspectral remote sensing. Program support is confined primarily to theoretical development of physics and signal processing. Instrument development is the subject of separate program announcements from NASA Headquarters (http://esto.nasa.gov/index.html).

5) Providing the scientific basis for observations of decadal ocean, ice and climate variability

   The present announcement seeks proposals undertaking development and analysis of satellite, paleo, and in-situ data sets; and theoretical developments in the area of decadal and longer timescale, coupled ocean-atmosphere modes of variability to catalyze future observing systems for such modes of variability. Proposals are also sought to conceptualize future observing systems and their attributes such as measurement accuracy, and spatial and temporal sampling intervals for such modes of variability.

6) Temporal and spatial variability of primary productivity and new production in ocean

   A key to understanding the 'biological pump' in the ocean is to learn about the variability of primary productivity. Seasonal or episodic blooms cause most of the variability, and thus knowledge of this variability will be needed to improve the accuracy of the productivity estimates of the global ocean.

7) Identification of phytoplankton taxonomic groups from space or airborne sensors

   Recent research indicates that carbon cycling within the euphotic layer depends upon plankton community structure, and that phytoplankton blooms may be the most significant phenomenon contributing to the export of carbon to the deep sea. Following the topic immediately above, a key to understanding carbon cycling in the ocean is to understand what controls blooms, for example diatom blooms. Aside from diatoms, other functional phytoplankton groups also play specific roles, such as the production of calcium carbonate or the fixation of nitrogen. Characterizing the distribution of these key phytoplankton groups using novel techniques is a central scientific goal.

8) Investigating and evaluating links between high latitude climate and lower latitude climate.

   Simulations suggest that the high latitudes (particularly the high, northern latitudes) will be most sensitive to any greenhouse gas – induced warming. Studies that can shed light on the extent to which climate at high latitudes are effectively and responsively linked to climate at lower latitudes through any oceanographic or sea ice response are important. Such studies will help to determine the amplitude and rapidity of the response of the climate system as a whole to any greenhouse gas – induced warming. Key elements of interaction include freshwater import and export, ice mass redistribution, thermohaline circulation and atmospheric dynamics, particularly in the marginal ice zone. The key is to be able to devise a strategy that enables the importance of these linkages to be evaluated and examines the energy, mass, and momentum exchanges within the ocean-ice-atmosphere system. This is likely to require close coupling of modeling and observational analysis.

9) Dynamics in coastal zones.

   The coastal ocean serves as an interface between land-derived materials and impacts from the open ocean. The importance of the coastal ocean, in terms of biogeochemical cycling and physical processes, to the ocean as a whole needs to be understood. Satellite observations of the coastal ocean can provide important information on coastal ocean processes, such as identifying event-scale phenomena, fronts, riverine plumes, and therefore assist in studies of biogeochemical cycling, and the relationship of the coastal to the open ocean, as well as the land. Furthermore, the coastal ocean needs to be embedded in larger-scale ocean models, and in models which describe land-ocean interactions. Proposals addressing these issues are sought.

10) Ice sheet mass balance and sea level rise

A major challenge in assessing and interpreting the mass balance lies in the deconvolution of processes that act on various time scales. These range from accumulation and surface ablation, which may be annual or decadal in nature, to ice sheet flow and deformation processes, which may occur on scales in excess of ten thousand years. Additionally, outlet glacier response to climate change occurs more rapidly than that of the ice sheet interior. Consequently, models that attempt to predict changes in ice sheet mass balance are limited by their ability to resolve these time-varying responses to climate change. In light of these considerations, this NASA Research Announcement solicits proposals primarily aimed at addressing the following topics:

- assessing the mass balance characteristics of the Greenland and Antarctic ice sheets and/or their major drainage basins
- putting these assessments in their proper temporal and spatial context and quantifying uncertainty
- providing quantitative insight into the mechanisms that drive this balance
- determining the time-scales on which these processes act
- investigating the behavior of important outlet glaciers and their mechanical links to the ice sheets that they drain
- developing methods and tools that will facilitate studies of components of the mass budget and processes that affect it (e.g. ablation measurement methods, assessment of ice sheet bed conditions, estimates and observations of precipitation, etc.)
- estimating contributions to sea level rise

11) As part of its mission, NASA encourages research to better utilize the satellite data for improving Seasonal to Interannual Climate Prediction and understanding the predictability of climate signal on those time scales. Research supporting this mission is funded through the Global Modeling and Analysis Program (GMAP) of the Earth Science Enterprise. Its goals are to:
i) develop the capability to use satellite data to initialize the coupled Atmosphere-Earth model(s) as accurately as possible,
ii) reduce model biases and improve climate forecast skill, and
iii) characterize the predictability of climate system on seasonal to interannual time scales. NASA's Seasonal to Interannual Prediction Project (NSIPP) is the core funded activity to undertake this mission.

GMAP seeks participation in this activity from university and laboratory scientists with special expertise in analyzing observational data as well as targeted areas of model development and ensemble climate forecast methods. The selected PIs will automatically form the second NSIPP Science Team. .

Specific areas in which GMAP/NSIPP seeks collaboration on additional research and development activities are detailed in Appendix A.

3.1 Funding

Total funds available for work selected for Oceanography, Ice, and Climate Research is approximately $24M over three years. The allocation of funds across the research themes

is based on the research priorities outlined in the ESE Research Strategy, the quality of proposals received and consideration of program balance. Proposals outside these themes may be considered, but must be highly meritorious and competitive.

Awards will be made for a period of up to three years to proposals that are approved under the terms of this announcement. Annual renewals of proposals under this NRA are contingent upon performance and availability of funds. NASA reserves the right to cancel this NRA if adequate funds are not appropriated.

4.0 GUIDANCE FOR PROPOSERS

This NRA solicits proposals for scientific investigations that are consistent with the objectives as detailed above, and that meet other requirements that are listed in the appendices. The proposal should provide sufficient detail to enable a reviewer to assess the value of the proposed research, and the probability that the investigators will be able to accomplish the stated objectives within the requested resources and schedule. Appendix A contains additional background information for proposals supporting NSIPP, and general guidelines for all NRAs are given in Appendix C.

Programmatic priority will be given to those proposals making the strongest links to Earth Science Enterprise objectives through analysis of remote-sensing data and by addressing oceanographic and climate prediction problems at basin or global scale. Priority ice sheet investigations are those that seek to assess and understand ice sheet mass balance characteristics on scales that significantly affect sea level.

Oceanography contacts are Dr. Eric Lindstrom (Physical Oceanography Program, 202-358-4540, elindstr@hq.nasa.gov), Dr. John Marra (Biological Oceanography Program, 202-358-0310, jmarra@hq.nasa.gov) and Dr. Waleed Abdalati, (Cryospheric Sciences Program, 202-358-0746, wabdalat@hq.nasa.gov). Climate Modeling contact is Dr. Yogesh Sud (Global Modeling and Analysis Program, 202-358-1306; ysud@hq.nasa.gov). The fax for all four contacts is the same, at 202-358-2770. Potential Investigators may like to discuss possible proposed projects with the principal investigator of the NSIPP core project, Dr. Michele Rienecker (301-614-5642; michele.rienecker@gsfc.nasa.gov). The selected, investigators will be collaborating with the relevant NSIPP scientists working with the PI.

4.1 Award Requirements

Each selected proposal will be supported under a grant, contract, or interagency agreement between the PI's institution and NASA HQ or one of the three NASA Oceanography Centers. All awards must comply with

- Annual progress reports
- Yearly participation at Science Team meetings and activities
- Provision of publicity material to NASA as appropriate

Investigators proposing **fieldwork or any data measurements** will be required to identify:

- Field campaigns, cruises
- Methods
- Data management.

Regarding the last item, unless otherwise specified, data obtained by support under this NRA must be ready for availability to the broad Earth science community within one year from collection and an appropriate plan and schedule must be provided in the proposal. For biological data, PIs in the program will also submit their data to the SeaWiFS Bio-Optical Archive and Storage System (SeaBASS). Submission procedures can be found at http://seabass.gsfc.nasa.gov/~seabass/seabass/html/seabass.html.

Investigators proposing **modeling or theoretical work** must clearly identify incremental tasks in accomplishing objectives.

Security. Proposals should not contain security-classified material. If the research requires access to, or may generate, security classified information, the submitter will be required to comply with U.S. Government security regulations.

4.2 Eligibility

Participation is open to all categories of domestic and foreign organizations, including educational institutions, industry, non-profit institutions, NASA centers, and other government agencies. In accordance with NASA policy as described in Appendix C, all investigations by foreign participants will be conducted on a no-exchange-of-funds basis, i.e., investigators whose home institution is outside the United States cannot be funded by NASA.

4.3 Notice of Intent

In order to plan for a timely and efficient peer review process, *Notices of Intent* (NOI's) to propose are strongly encouraged by November 5, 2001. The submission of a NOI is not a commitment to submit a proposal, nor is information contained therein considered binding on the submitter. NOI's are to be submitted electronically by entering the requested information through SYS-EYFUS Web site located at **http://proposals.hq.nasa.gov/**.

User identifications (IDs) and passwords are required by NASA security policies in order to access the SYS-EYFUS Web site.

If the proposer obtained a User ID and password in the process of submitting a Notice of Intent to Propose or a proposal for a previous research opportunity announcement, the same user UserID and password can be used to complete the electronic Notice of Intent to Propose in response to this research opportunity announcement.

If you do not have a SYS-EYFUS UserID or password, you may obtain one electronically by going to *http://proposals.hq.nasa.gov* and performing the following steps:

10) Click the hyperlink for **new user,** which will take you to the Personal Information Search Page.

11) Enter your first and last name. SYS-EYFUS will **search** for your record information in the SYS-EYFUS database.
12) Confirm your personal information by **choosing** the record displayed.
13) Select **continue**, and a User ID and password will be e-mailed to you.

Once you receive your User ID and Password, **login** to the SYS-EYFUS Web site and follow the instructions for **New Notice of Intent.**

At a minimum, the following information will be requested:

- NRA number, alpha-numeric identifier, (Note: this may be included on the Web site template);
- the Principal Investigator's name, mailing address, phone number, and E-mail address;
- the name(s) of any Co-Investigator(s) and institution(s) known by the NOI due date;
- a descriptive title of the intended investigation; and,
- a brief description of the investigation to be proposed.

A separate NOI must be submitted for each intended proposal. Note that this NOI may also be the preliminary version of the proposal *Cover Page/Proposal Summary*; if so, the Web site provides the user future use in updating this information for the final *Cover Page/Proposal Summary* as the deadline for submission of the final proposal approaches.

4.4 Schedule

Notice of Intent should be submitted by **November 5, 2001**. Proposals may be submitted at any time during the period ending **December 4, 2001**. Proposals submitted to NASA will be evaluated using scientific peer review. Proposals selected for funding is expected to be announced in **January, 2002**. Projected grant start date is **April X, 2002.**

4.5 On-line References

For more information pertaining to this NASA Research Announcement see:

(1) NASA Research Opportunities http://www.earth.nasa.gov/nra/index.html
(2) NASA Oceanography Web site http://oceans.nasa.gov
(3) NASA Cryospheric Sciences Program web site: http://cryosphere.nasa.gov
(4) NASA Seasonal-to-Interannual Prediction Project http://nsipp.gsfc.nasa.gov/

5.0 INSTRUCTIONS FOR SUBMITTING PROPOSALS

Identifier **NRA-01-OES-03**

Submit Proposals to:
Oceanography/NSIPP/Ice Sheets NRA (NRA 01-OES-03)
NASA Peer Review Services, Code Y
500 E Street, Suite 200
Washington, DC 20024-2760

For overnight delivery purposes only, the recipient telephone number is 202-479-9030

Copies required: 20

Selecting Official: Director, Research Division
Office of Earth Science
NASA Headquarters

Obtain Additional Information From:
Drs. Eric Lindstrom, John Marra, Waleed Abdalati or Yogesh Sud
Code YS
NASA Headquarters
Washington, D.C. 20546-0001
Phone: 202-358-4540, -0310, -0746
Fax: 202-358-2770
Email: elindstr@hq.nasa.gov, jmarra@hq.nasa.gov, wabdalat@hq.nasa.gov, ysud@hq.nasa.gov

Please use identifier number NRA 01-OES-03 when making an inquiry regarding this Announcement. Proposals submitted to NASA Headquarters will cause a delay, therefore, please adhere to "Instructions for Submitting Proposals" noted above. Your interest and cooperation in participating in this opportunity are appreciated.

ORIGINAL SIGNED BY:

Dr. Ghassem R. Asrar
Associate Administrator
Office of Earth Science

APPENDIX A

Additional background information for proposals supporting NSIPP

A. NSIPP activities at Goddard Space Flight Center

The initial ocean data assimilation system focuses on temperature and salinity profile data, surface altimeter data and surface wind observations in the tropics, but will eventually expand to other data types such as ocean current information from moorings, floats and drifters, SST data and precipitation observations, and will expand to global capabilities. The initial land surface data assimilation system aims at obtaining realistic soil moisture over the continental US but will expand on other data sets such as snow cover as well as to include global coverages.

The coupled general circulation model (CGCM), developed at Goddard is global; it uses an (AGCM) (e.g., Suarez and Takacs, NASA Tech. Memo. No. 104606, volume 5, 1995 and Bacmeister et al., NASA/TM-2000-104, 606, volume 17, 2000), a quasi-isopycnal ocean model (Schopf and Loughe, Mon. Wea. Rev., 123, 2839-2863, 1995), a state-of-the-art land surface model (LSM) (e.g., Koster and Suarez, J. Geophys. Res., 105, 24809-24822, 2000), and a thermodynamic sea-ice model. The CGCM system predicts global surface boundary conditions that are used AGCM-LSM system for the ensemble prediction of the teleconnections of ENSO. Ensemble simulations are used to assess the reliability and predictability of the NSIPP forecasts.

NSIPP modeling systems are implemented on a scalable parallel architecture computer system. Currently, a T3E parallel system with 1024 nodes, each with 128 MB memory, is available to support the project. Research partners selected through this NRA will be eligible to apply for use of the T3E system.

B. Specific needs of NSIPP

Examples of specific areas in which the NSIPP seeks collaboration on additional research and development activities:

(i) Studies of the predictability of the coupled ocean-atmosphere-land-sea- ice system with the NSIPP CGCM and/or with the simulation ensembles conducted by NSIPP.

(ii) Analyses and/or assessment of the performance of the NSIPP models and assimilation systems, especially through diagnostics of NSIPP simulations and assimilation output, and applications to process studies.

(iii) Utilization of the NSIPP component models and CGCM for satellite data impact studies, and for observing system experiments, especially contributing to the design of future satellite missions.

(iv) Evaluation of NSIPP experimental forecasts skill.

(v) Innovative developments in assimilation of land surface observations that pertain to the initialization of soil moisture and snow cover in coupled forecasts .

(vi) Development and processing of assimilation-friendly remotely sensed data streams for initialization of the ocean and land surface components of the NSIPP coupled forecast system .

(vii) Studies that consider the downscaling of large-scale impacts of SST anomalies to the regional climate and the application to regional forecasting.

(viii) Contributions to the NSIPP land surface model development efforts, especially improvements in the watershed representation.

(ix) Contributions targeted directly at improving the NSIPP atmospheric and/or ocean models; including the identification of systematic errors and deficiencies in model formulation.

Proposals that address other research topics will be considered provided relevancy to NSIPP goals is convincingly stated.

In addition to the usual budget request, proposals should include a statement of justification for any requested use of T3E computer resources that are required.

APPENDIX B

ADDITIONAL INFORMATION AND GUIDANCE ON PROPOSAL FORMAT AND CONTENTS

Proposal Content and Format. The technical part of the proposal should be limited to the equivalent of 14 pages of text, single-spaced, with type no smaller than 12 pt. A reasonable number of figures and tables (generally, 5 pages or less) may be included , and do not count toward the text limit. The cover page, table of contents, abstract, management plan, data plan, description of facilities and equipment, cost plan, citations to the literature, and short resumes also do not count in the 14-page limit. Additional pertinent information (e.g., letters indicating the commitment of co-investigators and collaborators or international partners) may be added as appendices. The proposal should be self-contained, and should not refer reviewers to critical information on web-sites. If color is used, proposers should ensure that all copies should have color. Proposals should not be bound or in covers.

Proposal Cover Page. The proposal cover page should contain the following: a short, descriptive title for the proposed effort; the name of the proposing organization(s); names, addresses, telephone numbers, FAX numbers, electronic mail addresses, and affiliations of the Principal Investigator and all Co-Investigators; and a year by year budget summary, including a total for all years. An example proposal cover page is provided in Appendix D.

Table of Contents (recommended length: 1 page). A table of contents listing the page numbers for key sections of the proposal, including the data, management, and cost plans should be provided.

Abstract (maximum of 1 page). The abstract should summarize the research proposed in one page or less. It should contain a simple, concise overview of the investigation, its objectives, its scientific approach, expected results, and the value of its results to the Oceanography and/or Sea-Ice Programs. It is very important that this abstract be specific and accurately represent the research to be conducted.

Project Description (maximum of 14 pages). The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance; relation to the present state of knowledge; and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the work plan, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. Deliverables should also be described.

Management Approach. For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities, and arrangements for ensuring a coordinated effort and timely data delivery should be described. Describe relationship among all individuals supporting the proposed effort, including leadership roles and points of contact. If individuals or organizations are in

geographically diverse locations, describe the specific process that will be used to coordinate activities, manage time and budget, and report progress.

Personnel. (2-3 pages per PI or Co-I). It is expected that the PI will be responsible for grant compliance and delivery. Short biographical sketches of the PI and all CoIs, containing a list of principal publications plus any exceptional qualifications should be included. Proposers should include previous work experience in the field of the proposal. Omit social security number and other personal items, which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

Facilities and Equipment. Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any government-owned facilities, industrial plant equipment, or special tooling that are proposed for use. Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non-research purposes should be explained.

Cost Plan for US Proposals Only. (recommended length: 1 page per budget year, 1 budget summary page, 1-2 pages of explanation/justification). A detailed cost plan must be provided for each year of the proposed effort. Costs should be broken down into all of the following categories that apply: salaries and wages (including staff-months and rates for all personnel), benefits, supplies, services, equipment purchases, data purchases, computer services, publication costs, communication, travel, miscellaneous/other and overhead. Any unusual requests for funds (e.g., computer, and expensive equipment) must be specifically justified. Contribution from any cost-sharing plan or other support for the proposed research should be detailed. PIs should budget for one major oceanography conference per year, and they should budget for one science team meeting per year if appropriate. If proposers wish to access the GSFC Supercomputer, they should not list costs, but indicate the number of computing units (CUs) they plan to use per year. The cost plan should include provision for buying data, if necessary. NASA's Earth Science Enterprise has adopted commercial data purchases as a mainstream way of acquiring research-quality data, as these commercial capabilities become available. NASA encourages the use of commercially available data sets by Principal Investigators as long as it meets the scientific requirements and is cost-effective. When responding to a NASA Research Announcement the proposer should identify the commercial data sources intended for use and the associated cost.

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Current and Pending Support. For other current projects being conducted by the principal investigator or proposed for funding, provide title of project, sponsoring agency, ending date, months of effort for the PI each year, and amount of support received or requested.

APPENDIX C

INSTRUCTIONS FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS

NASA Federal Acquisition Regulation (FAR), Supplement (NFS) Part 1852.235-72 , Effective JANUARY 2000 (modified)

(a) **General.**

(1) Proposals received in response to a NASA Research Announcement (NRA) will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a pre-award synopsis published for individual proposals.

(2) A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

(3) NRAs contain programmatic information and certain requirements which apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information which applies to responses to all NRAs.

(4) A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate instrument. Contracts resulting from NRAs are subject to the Federal Acquisition Regulation and the NASA FAR Supplement. Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPG 5800.1).

(5) NASA does not have mandatory forms or formats for responses to NRAs; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

(6) To be considered for award, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

(b) **NRA-Specific Items.** Several proposal submission items appear in the NRA itself: the unique NRA identifier; when to submit proposals; where to send proposals; number of copies required; and sources for more information. Items included in these instructions may be supplemented by the NRA.

(c) The following information is needed to permit consideration in an objective manner. NRAs will generally specify topics for which additional information or greater detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

(1) **Transmittal Letter or Prefatory Material.**

(i) The legal name and address of the organization and specific division or campus identification if part of a larger organization;

(ii) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;
(iii) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;
(iv) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;
(v) Identification of other organizations that are currently evaluating a proposal for the same efforts;
(vi) Identification of the NRA, by number and title, to which the proposal is responding;
(vii) Dollar amount requested, desired starting date, and duration of project;
(viii) Date of submission; and
(ix) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization (unless the signature appears on the proposal itself).

(2) **Restriction on Use and Disclosure of Proposal Information.** Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following notice on the title page of the proposal and specify the information subject to the notice by inserting an appropriate identification in the notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice.

Notice
Restriction on Use and Disclosure of Proposal Information

The information (data) contained in *[insert page numbers or other identification]* of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract (or other agreement) is awarded on the basis of this proposal the Government shall have the right to use and disclose this information (data) to the extent provided in the contract (or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

(3) **Abstract.** Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

(4) **Project Description.**

(i) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance; relation to the present state of knowledge; and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(ii) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should distinguish clearly between the first year's work and work planned for subsequent years.

(5) **Management Approach.** For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described.

(6) **Personnel.** The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications and any exceptional qualifications should be included. Omit social security number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

(7) **Facilities and Equipment.**

(i) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use. Include evidence of its availability and the cognizant Government points of contact.

(ii) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non-research purposes should be explained.

(8) **Proposed Costs (U.S. Proposals Only).**

(i) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages; fringe benefits; equipment; expendable materials and supplies; services; domestic and foreign travel; ADP expenses; publication or page charges; consultants; subcontracts; other miscellaneous identifiable direct costs; and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all staffing data in terms of staff-months or fractions of full-time.

(ii) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired; purpose and estimated number and lengths of trips planned; basis for indirect cost computation (including date of most recent negotiation and cognizant agency); and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases.

(iii) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831 (and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

(iv) Use of NASA funds--NASA funding may not be used for foreign research efforts at any level, whether as a collaborator or a subcontract. The direct

purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by U.S. award recipients is permitted. Additionally, in accordance with the National Space Transportation Policy, use of a non-U.S. manufactured launch vehicle is permitted only on a no-exchange-of-funds basis.

(9) **Security.** Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.

(10) **Current Support.** For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.

(11) **Special Matters.**

(i) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.

(ii) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

(d) **Renewal Proposals.**

(1) Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.

(2) NASA may renew an effort either through amendment of an existing contract or by a new award.

(e) **Length.** Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments.

(f) **Joint Proposals.**

(1) Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

(2) Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an agency commitment.

(g) **Late Proposals.** Proposals or proposal modifications received after the latest date specified for receipt may be considered if a significant reduction in cost to the Government is probable or if there are significant technical advantages, as compared with proposals previously received.

(h) **Withdrawal.** Proposals may be withdrawn by the proposer at any time before award. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

(i) **Evaluation Factors.**

(1) Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

(2) Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

(3) Evaluation of its intrinsic merit includes the consideration of the following factors of equal importance:

(i) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(ii) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.

(iii) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.

(iv) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

(4) Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds.

(j) **Evaluation Techniques.** Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within NASA. In all cases proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

(k) **Selection for Award.**

(1) When a proposal is not selected for award, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

(2) When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model award instrument and other information pertinent to negotiation.

(l) **Additional Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.**

(1) NASA welcomes proposals from outside the U.S. However, foreign entities are generally not eligible for funding from NASA. Therefore, unless otherwise noted in the NRA, proposals from foreign entities should not include a cost plan unless the proposal involves collaboration with a U.S. institution, in which case a cost plan for only the participation of the U.S. entity must be included. Proposals from foreign entities and proposals from U.S. entities that include foreign participation must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the foreign entity is proposing. Such endorsement should indicate that the

proposal merits careful consideration by NASA and, if the proposal is selected, sufficient funds will be made available to undertake the activity as proposed.

(2) All foreign proposals must be typewritten in English and comply with all other submission requirements stated in the NRA. All foreign proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received before the established closing date. Those received after the closing date will be treated in accordance with paragraph (g) of this provision. Sponsoring foreign government agencies or funding institutions may, in exceptional situations, forward a proposal without endorsement if endorsement is not possible before the announced closing date. In such cases, the NASA sponsoring office should be advised when a decision on endorsement can be expected.

(3) Successful and unsuccessful foreign entities will be contacted directly by the NASA sponsoring office. Copies of these letters will be sent to the foreign sponsor. Should a foreign proposal or a U.S. proposal with foreign participation be selected, NASA's Office of External Relations will arrange with the foreign sponsor for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency or funding institution will each bear the cost of discharging their respective responsibilities.

(4) Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

(i) An exchange of letters between NASA and the foreign sponsor; or

(ii) A formal Agency-to-Agency Memorandum of Understanding (MOU).

(m) **Export Control Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.**

(1) Foreign proposals and proposals including foreign participation must include a section discussing compliance with U.S. export laws and regulations, e.g., 22 CFR Parts 120-130 and 15 CFR Parts 730-774, as applicable to the circumstances surrounding the particular foreign participation. The discussion must describe in detail the proposed foreign participation and is to include, but not limited to, whether or not the foreign participation may require the prospective proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary, discuss whether the license has been applied for or if not, the projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available at http://www.pmdtc.org and http://www.bxa.doc.gov. Proposers are advised that under U.S. law and regulations, spacecraft and their specifically designed, modified, or configured systems, components, and parts are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120-130.

(n) **Cancellation of NRA.** NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation.

(End of provision)

Appendix D

Proposal Cover Page

NASA Research Announcement 01-OES-03
Proposal No. _____ (Leave Blank for NASA Use)

Title: _____

Principal Investigator:_____ Signature:_____
Department:_____

Institution: _____

Street/PO Box: _____

City: _____ State: _____ Zip: _____

Country: _____ Congressional District:_____
(used for database sorting purposes only)
E-mail: _____

Telephone: _____ Fax: _____

Co-Investigators:

Name	Institution & Email Address	Address & Telephone
_____	_____	_____
_____	_____	_____
_____	_____	_____

Budget:
1st Year: _____ 2nd Year: _____ 3rd Year: _____ Total: _____

Certification of Compliance with Applicable Executive Orders and U.S. Code

By submitting the proposal identified in this *Cover Sheet/Proposal Summary* in response to this Research Announcement, the Authorizing Official of the proposing institution (or the individual proposer if there is no proposing institution) as identified below:

- certifies that the statements made in this proposal are true and complete to the best of his/her knowledge;
- agrees to accept the obligations to comply with NASA award terms and conditions if an award is made as a result of this proposal; and
- confirms compliance with all provisions, rules, and stipulations set forth in the two Certifications contained in this NRA [namely, (i*) Assurance of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs, and (ii) Certifications, Disclosures, And Assurances Regarding Lobbying and Debarment & Suspension*].

Willful provision of false information in this proposal and/or its supporting documents, or in reports required under an ensuing award, is a criminal offense (U.S. Code, Title 18, Section 1001).

Title of Authorizing Institutional Official: _____

Signature: _____ Date: _____

Name of Proposing Institution: _____

Telephone: _____ E-mail: _____ Facsimile: _____

Assurance of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs

The *(Institution, corporation, firm, or other organization on whose behalf this assurance is signed, hereinafter called "Applicant ")* hereby agrees that it will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352), Title IX of the Education Amendments of 1972 (20 U.S.C. 1680 et seq.), Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and the Age Discrimination Act of 1975 (42 U.S.C. 16101 et seq.), and all requirements imposed by or pursuant to the Regulation of the National Aeronautics and Space Administration (14 CFR Part 1250) (hereinafter called "NASA") issued pursuant to these laws, to the end that in accordance with these laws and regulations, no person in the United States shall, on the basis of race, color, national origin, sex, handicapped condition, or age be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant receives federal financial assistance from NASA; and hereby give assurance that it will immediately take any measure necessary to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of federal financial assistance extended to the Applicant by NASA, this assurance shall obligate the Applicant, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which the federal financial assistance is extended or for another purpose involving the provision of similar services or benefits. If any personal property is so provided, this assurance shall obligate the Applicant for the period during which it retains ownership or posession of the property. In all other cases, this assurance shall obligate the Applicant for the period during which the federal financial assistance is extended to it by NASA.

This assurance is given in consideration of and for the purpose of obtaining any and all federal grants, loans, contracts, property, discounts, or other federal financial assistance extended after the date hereof to the Applicant by NASA, including installment payments after such date on account of applications for federal financial assistance which were approved before such date. The Applicant recognizes and agrees that such federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the Applicant, its successors, transferees, and assignees, and the person or persons whose signatures appear on the Proposal Cover Sheet above are authorized to sign on behalf of the Applicant.

CERTIFICATIONS, DISCLOSURES, AND ASSURANCES
REGARDING LOBBYING AND DEBARMENT & SUSPENSION

1. LOBBYING

As required by Section 1352, Title 31 of the U.S. Code, and implemented at 14 CFR Part 1271, as defined at 14 CFR Subparts 1271.110 and 1260.117, with each submission that initiates agency consideration of such applicant for award of a Federal contract, grant, or cooperative agreement exceeding $ 100,000, the applicant must **certify** that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit a Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

2. GOVERNMENTWIDE DEBARMENT AND SUSPENSION

As required by Executive Order 12549, and implemented at 14 CFR 1260.510, for prospective participants in primary covered transactions, as defined at 14 CFR Subparts 1265.510 and 1260.117—

(1) The prospective primary participant **certifies** to the best of its knowledge and belief, that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency.

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (l)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

(2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

APPENDIX E

BUDGET SUMMARY

For period from _____ to _____

- Provide a complete Budget Summary for year one and separate estimated for each subsequent year.
- Enter the proposed estimated costs in Column A (Columns B & C for NASA use only).
- Provide as attachments detailed computations of all estimates in each cost category with narratives as required to fully explain each proposed cost. See *Instructions For Budget Summary* on following page for details.

	A	NASA USE ONLY | B	C
1. Direct Labor (salaries, wages, and fringe benefits)	_____	_____	_____
2. Other Direct Costs:			
a. Subcontracts	_____	_____	_____
b. Consultants	_____	_____	_____
c. Equipment	_____	_____	_____
d. Supplies	_____	_____	_____
e. Travel	_____	_____	_____
f. Other	_____	_____	_____
3. Indirect Costs*	_____	_____	_____
4. Other Applicable Costs:	_____	_____	_____
5. SUBTOTAL--Estimated Costs	_____	_____	_____
6. Less Proposed Cost Sharing (if any)	_____	_____	_____
7. Carryover Funds (if any)			
a. Anticipated amount : _____			
b. Amount used to reduce budget	_____	_____	_____
8. Total Estimated Costs	_____	_____	XXXXXXX
9. APPROVED BUDGET	XXXXXX	XXXXXXX	_____

*Facilities and Administrative Costs

INSTRUCTIONS FOR BUDGET SUMMARY

1. Direct Labor (salaries, wages, and fringe benefits): Attachments should list the number and titles of personnel, amounts of time to be devoted to the grant, and rates of pay.

2. Other Direct Costs:
    a. Subcontracts: Attachments should describe the work to be subcontracted, estimated amount, recipient (if known), and the reason for subcontracting.
    b. Consultants: Identify consultants to be used, why they are necessary, the time they will spend on the project, and rates of pay (not to exceed the equivalent of the daily rate for Level IV of the Executive Schedule, exclusive of expenses and indirect costs).
    c. Equipment: List separately. Explain the need for items costing more than $5,000. Describe basis for estimated cost. General purpose equipment is not allowable as a direct cost unless specifically approved by the NASA Grant Officer. Any equipment purchase requested to be made as a direct charge under this award must include the equipment description, how it will be used in the conduct of the basic research proposed and why it cannot be purchased with indirect funds.
    d. Supplies: Provide general categories of needed supplies, the method of acquisition, and the estimated cost.
    e. Travel: Describe the purpose of the proposed travel in relation to the grant and provide the basis of estimate, including information on destination and number of travelers where known.
    f. Other: Enter the total of direct costs not covered by 2a through 2e. Attach an itemized list explaining the need for each item and the basis for the estimate.

3. Indirect Costs*****: Identify F&A cost rate(s) and base(s) as approved by the cognizant Federal agency, including the effective period of the rate. Provide the name, address, and telephone number of the Federal agency official having cognizance. If unapproved rates are used, explain why, and include the computational basis for the indirect expense pool and corresponding allocation base for each rate.

4. Other Applicable Costs: Enter total explaining the need for each item.

5. Subtotal-Estimated Costs: Enter the sum of items 1 through 4.

6. Less Proposed Cost Sharing (if any): Enter any amount proposed. If cost sharing is based on specific cost items, identify each item and amount in an attachment.

7. Carryover Funds (if any): Enter the dollar amount of any funds expected to be available for carryover from the prior budget period Identify how the funds will be used if they are not used to reduce the budget. NASA officials will decide whether to use all or part of the anticipated carryover to reduce the budget (not applicable to 2nd-year and subsequent-year budgets submitted for award of a multiple year award).

8. Total Estimated Costs: Enter the total after subtracting items 6 and 7b from item 5.

***** Facilities and Administrative (F&A) Costs

Appendix F

Required Proposal Pages

Two proposal cover pages are required as part of the proposal. The first is a **hard copy** (see Appendix D) which must be signed by the Principal Investigator and an official by title of the investigator's organization who is authorized to commit the organization. This authorizing signature also certifies that the proposing institution has read and is in compliance with the required certifications printed in full, therefore, these certifications do not need to be submitted separately. This page will not be counted against the page limit of the proposal.

The second proposal cover page must be submitted **electronically** to the SYS-EYFUS Web site located at **http://proposals.hq.nasa.gov/**.

If the proposer has submitted an electronic Notice of Intent (Section 4.3) to SYS-EYFUS, the same user UserID and password can be used to complete the electronic proposal cover page. If the proposer obtained a User ID and password in the process of submitting a Notice of Intent or proposal for a previous research opportunity announcement, the same user UserID and password can be used to complete the electronic proposal cover page in response to this research opportunity announcement.

If you do not have a SYS-EYFUS UserID or password, you may obtain one electronically by going to *http://proposals.hq.nasa.gov* and performing the following steps:

(1) Click the hyperlink for **new user,** which will take you to the Personal Information Search Page.
(2) Enter your first and last name. SYS-EYFUS will search for your record information in the SYS-EYFUS database.
(3) Confirm your personal information by choosing the record displayed.
(4) Select continue, and a User ID and password will be e-mailed to you.

Once you receive your User ID and Password, login to the SYS-EYFUS Web site and follow the instructions for **New Proposal Cover Page.**

Proposers without access to the Web or who experience difficulty in using this site may contact the Help Desk at proposals@hq.nasa.gov (or call 202.479.9376) for assistance. Please note that submission of the electronic Cover does not satisfy the deadline for proposal submission.